

# THE MEANU: UNIVERSITY-OF-ALBERTA ACOUSTICAL LABORATORY

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## Résumé

Le MEANU est un laboratoire d'acoustique relevant de l'Université de l'Alberta qui permet d'effectuer des essais commerciaux sur des produits et assemblages communément utilisés en construction au Canada, et pour d'éventuellement de la recherche.

**Mots clefs :** MEANU, Université de l'Alberta, Laboratoire d'acoustique

## Abstract

The MEANU is an acoustical laboratory under the University of Alberta that provides capability for commercial testing of products and assemblies commonly used in construction in Canada and for possible research.

**Keywords:** MEANU, University of Alberta, Acoustics Lab

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## 1 Introduction

The MEANU is a unique entity on the Canadian acoustical landscape. The Mechanical Engineering Acoustics and Noise Unit ("MEANU") encompasses two Reverberation Chambers (310 m<sup>3</sup> and 227m<sup>3</sup>) and typical supporting infrastructure. It is an off-Campus Lab under Mechanical Engineering of the University of Alberta (Edmonton). Primarily, it currently is used for commercial testing, though it has the capability for research. The following provides a brief description of facility history, test chambers and an overview of typical current testing projects.

## 2 History

The MEANU was founded in the early-1970's by Eugene Bolstad, P.Eng. The vision was that the facility would serve as home-base to a full-service acoustical company, including acoustical consulting, product testing and research. It operated as such for just over a decade, at which point, in the wake of a changing marketplace, the MEANU became an asset of the University of Alberta. The "ribbon-cutting" as a University facility was done with then (federal) Minister of State for Science and Technology, the Honorable Tom Siddon, himself trained as an acoustics researcher.

The deployment as a Mechanical Engineering asset was facilitated and overseen by lead researchers in acoustics and vibration Gary Faulkner (Ph.D.) and Tony Craggs (Ph.D.). Gerald ("Gerry") Kiss, P. Eng., was the Research Associate in charge of managing project work, developing testing procedures in accordance with ASTM (and other) standards, and maintaining and upgrading equipment. Gerry was a member of the ASTM Technical Committee responsible for several of the standards that form the core of current

MEANU testing. Thus, he developed customized testing software that exactly tracked with the requirements of the standards; Gerry "had a passion" for measurement accuracy. He was honoured by local colleagues in late-1999 for his work and, unfortunately, passed away in early-2000. His legacy lives on in current MEANU-work as well as his contributions to international standards.

The present author was invited by Mechanical Engineering to continue MEANU work as of Spring 2000.

## 3 Facility Description

The primary testing feature of the MEANU is its reverberation-chamber suite. This consists of two chambers, built as two independent rooms, each constructed of concrete block (floor is smooth concrete, unpainted; ceiling/roof is pre-cast concrete planks). The shared wall between the Chambers is comprised of the two block walls which are sand-filled, set 100m apart and with this gap filled with fibrous insulation. A sound-intensity test of this assembly indicated an STC-rating in the range of STC-70. On the shared wall between the two Chambers there is a wood-framed test opening 2.7m wide by 2.4m high (nominal) on the Small-Chamber wall and steel-framed on Large-Chamber side. The only physical connection between the two Chambers is a thin strip of lead flashing bridging the 100mm gap.

For some types of testing a "plug-wall" is inserted into the Test Opening (from Large Chamber) so as to acoustically segregate the Chambers. The plug-wall, comprised of a steel surround frame and supporting 11 layers of dry-wall, is moved by means of a custom designed-and-built wheeled gantry. Both Chambers are equipped with "acoustical doors", whose ratings are in the range of STC-50.

The Chambers are each equipped with a set of curved plywood diffusers which are hung at random angles so as to aid with sound diffusion.

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## 4 Typical Project Work

In the “early years” as a University facility various student projects based at the MEANU facilitated in the granting of advanced degrees. Since retirement of both lead researchers this has become infrequent.

The majority of current MEANU project work consists of commercial testing in accordance with ASTM test procedures E90 (for the derivation of sound transmission loss) and C423 (for the quantifying of sound absorption), with occasional requests for noise isolation and/or insertion loss (per ASTM E596). Results can also be generated per the corresponding ISO standards.

A sampling of the types of products/assemblies tested include: (per ASTM E90) glazing assemblies (with or without framing), a wide variety of wall assemblies including insulated metal (especially for the petro-chemical sector), foam-based walls, multi-element modular (wood/insulated), concrete-block, hemp-block, various types of demountable walls, roadside barriers comprised of (among others) poly-vinyl, recycled poly-ethylene, compressed rubber-crumb, heavy wood planking, and sand+soil-filled bags; (per ASTM C423) stage curtains, sport/recreation-facility ceiling baffles and wall panelling, felt baffles/panels, vinyl planking, plywood, acoustical-foam, perforated-metal panels, among others. It is not uncommon with smaller-sized specimens submitted for E90-testing that part of the Test Opening is filled with a portion of Filler Wall (whose STC-rating is more than 10 STC points above that anticipated for the test specimen). For C423-testing most commonly the specimen is either an 8ft-by-9ft specimen laid in the A-mounting (on Small Chamber floor) at a diagonal to the Chamber’s cardinal dimensions and with its outer perimeter blocked-and-sealed OR suspended in various “baffle” configurations from a set of cables strung diagonally across the test Chamber. Though much less common, large-scale specimens can be tested in the Large Reverberation Chamber (for C423 testing) and alternate mountings (per ASTM E795) can be accommodated in either Chamber.



**Figure 1:** Specimen prepared for ASTM C423 testing.



**Figure 2 :** Window Specimen prepared for STC-testing, showing Filler Wall above Specimen

## 5 Closing

Lastly, as an entity within the University of Alberta, the MEANU has recently become part of the Sound Studies Initiative (“SSI”), a forum that facilitates collaboration between any-and-all researchers at U-of-A engaged in some aspect of research involving SOUND. A link to the MEANU web-page can be found on the SSI web-page: [ [soundstudies.ualberta.ca](http://soundstudies.ualberta.ca) ] .

## Acknowledgment

MEANU work continues thanks to those who followed through with their original vision (named above) and current University leadership, and with thanks to Clientele who continue to support it through on-going project-work.



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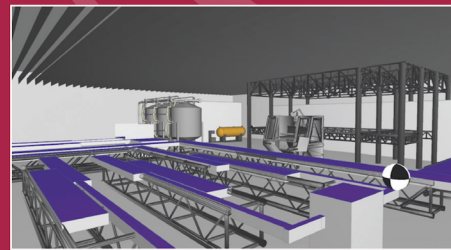
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